ADDENDUM TO CONFIRMATION SOIL SAMPLING AND ANALYSIS PLAN

FOR REFUGIO INCIDENT – PIPELINE EXCAVATION AREA

(ADDRESSES SECTIONS 1-4)

Approved by RP IC:

_____ Date: _____

Approved by SBCoOEM IC:

_____ Date: _____

Approved by State CAOFW IC:

_____ Date: _____

Approved by USEPA IC:

_____ Date: _____

Approved by USCG IC:

_____ Date: _____

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1.0 INTRODUCTION

The *Confirmation Soil Sampling and Analysis Plan For Refugio incident – Pipeline Excavation Area* (approved by Unified Command [UC] on June 3, 2015) was prepared on behalf of the Environmental Unit supporting UC, to present the high level rationale and basis for the collection of confirmation samples associated with the crude oil release on Line 901, Mile Post 4 near Santa Barbara, California, in accordance with Order 2015-01-FPNA15017. The areas in Section 1 addressed by the June 3, 2015, plan includes:

- The base and along the north, east, and south sidewalls of the pipeline repair excavation;

Whereas this Addendum includes remaining areas within Section 1 which include:

- West end of the pipeline repair excavation
- the Berm on the south end of Section 1
- the area that has been excavated where oil pooled against the berm south of the pipeline.

This Addendum also addresses Sections 2-4 (drainage pipe to the cliff face). Refer to Attachment A for maps.

2.0 DESCRIPTIONS OF SECTIONS 1-4

A description of each Section is provided in the subsections below.

2.1 SECTION 1 - RELEASE SITE (EXCAVATION AREA AND INLET DRAINAGE)

Section 1 is located on the north side of California Highway 101 (Hwy 101) within the property boundaries of assessor parcel number (APN) 081-210-047. Visually impacted soil remains at the west end of the pipeline repair excavation, as well as in the Berm located adjacent and south of the pipeline repair excavation. Excavation efforts to remove impacted material directly adjacent to the pipeline cannot begin until the pipeline has been stabilized with backfill material. All soil confirmation sampling locations within Section 1 will be in reference to the west end of the pipeline repair excavation, areas outside the pipeline repair excavation area, including the Berm, and the inlet to the drainage conduit.

The inlet of the drainage conduit is located adjacent to the west end of the pipeline repair excavation and approximately 200 feet north of the Hwy 101 north right-of-way (see Attachment A – Feature A). The length of drainage conduit from the inlet to the drainage conduit termination point, located adjacent to the Hwy 101 north right-of-way, is approximately 170 linear feet.

2.2 SECTION 2 - DRAINAGE PIPE

Section 2 includes the drainage conduit termination point as well as a concrete drainage collection area (see Attachment A – Feature B). The concrete drainage collection area is comprised of three separate concrete swales, as well as the inlet for the drainage pipe that runs under Hwy 101.

The drainage pipe that runs under Hwy 101 measures approximately 250 linear feet from the inlet on the north side of the Hwy 101 north right-of-way to the termination point located on the south side of Hwy 101 (see Attachment A – Feature B). A drainage drop inlet is located in the median of Hwy 101, adjacent to the north side of the Hwy 101 south right-of-way (see Attachment A – Feature C). The termination point of the drainage pipe is located approximately 6 feet from the culvert inlet that runs under the Union Pacific Railroad (UPRR) track.

2.3 SECTION 3 – UPRR CULVERT

Section 3 includes the drainage pipe termination point and the inlet for the culvert pipe that runs under the UPRR track. The culvert measures approximately 20 linear feet from the inlet on the north to the termination point on the south (see Attachment A- Feature D).

2.4 SECTION 4 – BLUFF AND CLIFF

The Bluff area extends from the termination point of the culvert that runs under the UPRR track to the approximate edge of the cliff face (see Attachment A). The Bluff area impacted by the release is generally longer than it is wide as it follows the path of historical drainage. Although the historic drainage path meanders, the approximate length of the impacted area is approximately 200 feet. The width of the impacted area varies towards the Cliff. Several constraints exist within Section 4 as established by the June 6, 2015, UC approved plan, *Constraints Assessment Team (CAT) Activities Related to Cleaning of Cliff Faces and Contiguous Rocky Prominences*.

3.0 SAFETY AND CONSTRAINTS

All sampling and excavation/removal of visually-impacted media will be conducted in accordance with the UC approved Refugio Incident *Site Safety and Health Plan*. All sampling and excavation/removal of visually-impacted media will only occur if it can be reasonably and safely done. All sampling and removal activities will be approved by a safety officer prior to commencing.

All sampling and excavation/removal of visually-impacted media will be conducted in accordance with the UC approved plan, *Constraints Assessment Team (CAT) Activities Related to Cleaning of Cliff Faces and Contiguous Rocky Prominences*.

4.0 SAMPLING OBJECTIVES

The objective of this Addendum is as follows:

- Establish confirmation soil sampling methodology, sample frequency, and analytical methods for Sections 1 through 4.
- Establish background and clean backfill soil sampling methodology, sample frequency, and analytical methods for Section 4.

The objective of the sampling under this Addendum is as follows:

- Confirm chemicals of concern (COCs) associated with the Refugio Incident are no longer present at concentrations above UC approved endpoints in Sections 1 through 4. We are aware and were directly involved in development of numeric cleanup criteria for Area 1 which could also be applied to the other terrestrial areas 2 & 3 as well. RB & EHS have both commented that numeric endpoints protective of the marine environment should be established for Area 4. Do currently approved endpoints for Area 4 include numeric criteria protective of marine environment and if so can you provide us with a copy?

5.0 DATA QUALITY OBJECTIVES

This Section on Data Quality Objectives (DQOs) presents the intended data usage and QA objectives for the sampling and analysis that will be performed for this Addendum. In general, the purpose of the DQOs are to establish a target level that can be measured against whether data collected are appropriate quality to produce documented, consistent, and technically defensible data. DQOs have been generated for the soil and water matrix following EPA Guidance on Systematic Planning using the Data Quality Objectives Process (QA/G-4 2006), and a worksheet listing the DQOs are attached to this Addendum (see Attachment B).

6.0 SOIL AND WATER SAMPLING AND METHODOLOGY

A strategic planning approach based on scientific methodology will be employed for data collection activities providing a systematic procedure to ensure the type, quantity, and quality of data used in decision-making will be appropriate for the intended soil confirmation sampling. General soil and water sampling methodologies will be used for all soil and water sampling activities as described in Section 6.1. Section-specific soil and water confirmation plans have been developed for each of the Sections (1 through 4) and are based on the existing conditions and features in each of the individual Sections (see Sections 7-10).

6.1 SAMPLING METHODOLOGY

Soil samples may be collected utilizing a slide hammer equipped with a stainless steel core barrel sampler containing a 6-inch stainless steel sleeve. The sampler will be manually driven into the soil at the desired depth. Teflon® tape will be placed at each open end of the sampling sleeve, and plastic end caps will be affixed over the Teflon® tape. In the likely event of refusal due to gravels and cobbles or the samples are not cohesive enough to be retained in the sampling sleeve, a decontaminated stainless steel spoon or trowel will be used. A decontaminated pick or shovel may also be necessary. Samples obtained by using a spoon or trowel will be collected into clean, laboratory-provided glass jars. Per the landowner's request, 50% of samples collected from Section 1 will be collected in a manner consistent with Environmental Protection Agency (EPA) Method 5035 for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) – gasoline range organics (GRO). A total 5% of samples collected in Sections 2-3 will be collected in a manner consistent with EPA Method 5035 for VOCs and TPH – GRO. In Area 4 every effort will be made to collect intact samples using a slide hammer. If refusal occurs due to gravels and cobbles or lack of cohesive soils, at least 20% of samples for VOCs and GRO will be collected using EPA Method 5035.

Soils for the composite sample will be placed into decontaminated stainless steel bowls and homogenized prior to filling glass containers. Samples for VOC analysis will be filled directly from the boring with no homogenization.

Each laboratory supplied sample container will be completely filled to minimize headspace. Vegetation, rocks, litter, and other non-native soil material will be carefully removed prior to filling sample containers, when practical to do so.

Prior to confirmation sampling, an environmental representative will visually assess the area. Additional excavation may be required to remove visually impacted media prior to confirmation sampling. Soil samples will be field screened for VOCs utilizing a hand-held photo-ionization detector (PID). Additional soil samples may be collected based on field observations. Samples will be collected by an experienced field scientist. Information recorded will include soil type and description, color, and moisture content. Pertinent information concerning the occurrence of impacted material (e.g., odors, staining, PID readings) will also be documented.

Field teams, composed of CTEH® personnel, will be deployed with appropriate equipment and supplies to collect surface water samples. All sampling will be documented in field notebooks, CTEH® field forms, or hand-held devices.

Surface water samples will be decanted directly into laboratory supplied sample containers and submitted to Pace Analytical (Pace). Water samples for metals analyses should be field filtered.

6.2 ANALYTICAL METHODS

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil and water samples will be analyzed under rapid turnaround (typically within 24-hrs) time. In general, soil and/or water samples in Sections 1 - 3 will be sampled for the following:

- Total Petroleum Hydrocarbons using Modified EPA Method 8015 (or 8260 for GRO)
- VOCs using EPA Method 8260
- PAHs using EPA Method 8270C[1] SIM, (considering need to be protective of marine receptors such as invertebrates suggest you consider using EPA Method 8272c as recommended by Dr. Michael Berg of CTEH for marine sediment sampling) and
- CAM 17 metals using EPA Method 6010/7471

At the request of the Central Coast Regional Water Quality Control Board (CCRWQCB), soil/water samples collected from Section 4 will also be submitted for analyses of:

- Mass EPH/VPH (Extractable Petroleum Hydrocarbons/Volatile Petroleum Hydrocarbons) using fractionation methods per the Massachusetts Department of Environmental Protection (May 2004); and
- Synthetic Precipitation Leaching Procedure (SPLP) using EPA Method 1312 will be run for VOCs, SVOCs, TPH and metals analysis listed above. Up to four samples will be analyzed using SPLP. The samples with the highest total concentration for VOCs, SVOCs, TPH and metals will be selected for SPLP analysis.

Analytical testing will be performed according to the methods outlined above which include analysis previously approved in the *Emergency Response Environmental Sampling and Analysis Plan*, as well as additional analysis requested by the CCRWQCB and Santa Barbara County Environmental Health Services (SBCEHS). This project will follow well-recognized analytical methods for all samples analyzed by National Environmental Laboratory Accreditation Program (NELAP) certified labs. Samples will be sent to Pace Analytical Services, Inc. (PACE).

Analysis, analytical methods, sample containers details, preservation, and holding times are detailed in Table 1 and 2.

[1] PAH analysis using EPA Method 8272 will only be used for the marine environment. PAH analysis using EPA Method 8270C will be used for soil in the upper release area.

Table 1 Soil Sampling Summary

ANALYSIS	METHOD	SAMPLE CONTAINER	PRESERVATIVE	HOLD TIME
Volatile Organic Compounds (VOCs)	EPA 8260 or EPA 5035*	Stainless steel sleeve or 1 x 4 oz. soil jar or Encores	None; Ice, maintained at 0-6°C	7 days preserved; 14 days unpreserved
Total Petroleum Hydrocarbons (TPH) – Gasoline Range Organics (GRO)	Mod. EPA 8260/8015	1 x 4 oz. soil jar	None; Ice, maintained at 0-6°C	14 days
Diesel Range Organics (DRO), and Oil Range Organics (ORO) [no silica gel]	Mod. EPA 8015	1 x 4 oz. soil jar	None; Ice, maintained at 0-6°C	14 days from collection to analysis; 40 days from extraction to analysis
Polycyclic Aromatic hydrocarbons (PAHs)	EPA 8270C SIM	1 x 4 oz. soil jar	None; Ice, maintained at 0-6°C	14 days from collection to analysis; 40 days from extraction to analysis
Metals (CAM17)	EPA 6010/ 7471	1 x 4 oz. soil jar	None; Ice, maintained at 0-6°C	6 months for 6010 28 days for 7471
Fractionated TPH (EPH/VPH)**	MASS DEP EPH/VPH	1 x 4 oz. amber soil jar	None, Ice maintained at 0-6°C	Samples must be extracted within 14 days and extracts analyzed within 40 days of extraction
Synthetic Precipitation Leaching Procedures (SPLP)** SPLP for VOCs, SVOCs, TPH, and metals	EPA 1312	1 X 1L glass jar	None, Ice maintained at 0-6°C	14 days to SPLP, then follow analytical methods

*~50% of samples in Section 1 and 5% of samples in Sections 2-4 will be collected in an EPA 5035 approved containers i.e. Encores

** Method will only be run in Section 4.

Table 2 Water Sampling Summary

ANALYSIS	METHOD	SAMPLE CONTAINER	PRESERVATIVE	HOLD TIME
Volatile Organic Compounds (VOCs)	8260	3 x 40 mL VOA vials	HCl to pH < 2; Ice, maintained at 0-6°C	7 days unpreserved; 14 days preserved
Total Petroleum Hydrocarbons (TPH) – Gasoline Range Organics (GRO)	8260/8015	3 x 40 mL VOA vials	HCl to pH < 2; Ice, maintained at 0-6°C	7 days unpreserved; 14 days preserved
Diesel Range Organics (DRO), and Oil Range Organics (ORO)	8015	1 x 1 L Amber Glass	Ice, maintained at 0-6°C	7 days from collection to extraction; 40 days from extraction to analysis
Polycyclic Aromatic hydrocarbons (PAHs)	8270C SIM	1 x 1 L Amber Glass	Ice, maintained at 0-6°C	7 days from collection to extraction; 40 days from extraction to analysis
Metals (CAM 17)	6010/7471	1 x 250 mL Poly	HNO_3, maintained at 0-6°C	6 months for 6010 28 days for 7471
Fractionated TPH (EPH/VPH)*	MASS DEP EPH/VPH	2 X 1L Amber glass	HCl to pH < 2; Ice, maintained at 0-6°C	14 days to extraction; 40 days from extraction to analysis

*Method will only be run in Section 4 near the Bluff

7.0 SECTION 1: RELEASE SITE SAMPLING PLAN

The sampling plan for this Section focuses on the visually discolored soil at the west end of the pipeline repair excavation, the sidewall of the Berm located adjacent to and south of the pipeline repair excavation (Berm), and areas adjacent to the inlet culvert.

The west end of the excavation will be sampled in the same manner that the east end was sampled (two samples from each side of the pipeline). The Berm will be sampled at the same frequency as outlined in the June 3, 2015, *Confirmation Soil Sampling and Analysis Plan For Refugio incident – Pipeline Excavation Area*.

Sampling for the Inlet Culvert in Section 1 is a follows:

- One composite soil sample will be collected from the areas immediately adjacent to the inlet culvert.
- Samples will be collected at depths of 0 – 6 inches. – due to time frame since release that has likely resulted in release of VOCs from surface soil, recommend the sample depth be 6-12 inches

7.1 SECTION 1 SAMPLING SCHEDULE

It is anticipated that the soil samples in Section 1 will be collected in one to two days once sampling has been visually cleared, the area is safe to sample, and sampling commences barring any weather, safety concerns, or operational delays. Soil samples will be collected once, unless results indicate additional cleaning/excavation is required or otherwise instructed by UC.

7.2 SECTION 1 ANALYTICAL METHODS

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil samples will be analyzed under rapid turnaround (typically within 24-hrs). See **Table 1** for soil sample methods.

8.0 SECTION 2: DRAINAGE PIPE SAMPLING PLAN

The sampling plan for the surface features in Section 2, including the drainage conduit outlet from Section 1 that terminates in Section 2, is as follows:

8.1 CONCRETE DRAINAGE COLLECTION AREA

For details about the concrete drainage collection area, refer to Attachment A – Feature B.

- Up to four discrete soil samples will be collected immediately surrounding the collection basin in an

area that was not impacted by the release.

- Samples will be collected at depths of 0 – 6 inches.

The above samples will be collected from soil outside the drainage collection area that was not impacted by the release. These samples are being collected to establish baseline soil concentrations of any contaminants of concern unrelated to the Refugio Incident that may be released to stormwater runoff from the area immediately surrounding the collection basin.

8.2 Drainage Conduit Water Sampling

The drainage conduit will be flushed by introducing water at the inlet located in Section 1 (see Attachment A – Feature A). A sample of the water will be collected before the flushing process to be used as a baseline. Water will be contained and recovered as it exits the outlet and before it enters the drainage collection area.

- One water sample will be collected at the termination point (refer to Attachment A – Feature B).

The water sample collected from the outlet will be analyzed according to the methods outlined in **Table 2**.

8.3 Drainage Pipe Drop Inlet

- Three discrete soil samples will be collected adjacent to the drainage drop inlet (see Attachment A – Feature C).
- Samples will be collected at depths of 0 – 6 inches.

Water samples will be analyzed according to the methods outlined in **Table 2**.

8.4 Section 2 Sampling Schedule

It is anticipated that the soil and water samples in Section 2 will be collected in one day once sampling has been visually cleared, the area is safe to sample, and sampling commences in Section 2 barring any weather, safety concerns, or operational delays. Soil and water samples will be collected once, unless results indicate additional cleaning/excavation is required or otherwise instructed by UC.

8.5 Section 2 Analytical Methods

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil samples will be analyzed under rapid turnaround (typically within 24-hrs). See **Table 1** for soil sample methods and **Table 2** for water sample methods.

9.0 SECTION 3: CULVERT SAMPLING PLAN

Sampling of the Section 3 Culvert will consist of the following:

- One composite sample will be collected from the area surrounding and within the wooden wing wall of the culvert (refer to Attachment A – Feature D).
- Samples will be collected at depths of 0 – 6 inches.

9.1 DRAINAGE PIPE WATER SAMPLING

The drainage pipe will be flushed by introducing water at the inlet located in Section 2. A sample of the water will be collected before the flushing process to be used as a baseline. Water will be contained and recovered before it reaches soil or concrete.

- One water sample will be collected at the termination point (refer to Attachment A – Feature E).

Water samples will be analyzed according to the methods outlined in **Table 2.**

9.2 SECTION 3 SAMPLING SCHEDULE

It is anticipated that the soil and water samples in Section 3 will be collected in one day once sampling has been visually cleared, the area is safe to sample, and sampling commences in Section 3 barring any weather, safety concerns, or operational delays. Soil and water samples will be collected once, unless results indicate additional cleaning/excavation is required or otherwise instructed by UC.

9.3 SECTION 3 ANALYTICAL METHODS

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil samples will be analyzed under rapid turnaround (typically within 24-hrs). See **Table 1** for soil sample methods and **Table 2** for water sample methods.

10.0 SECTION 4: BLUFF AND CLIFF SAMPLING PLAN

The sampling plan for the surface features in Section 4 is outlined in the Sections below.

10.1 BLUFF

Soil samples will be collected using a transect system. From the culvert to the edge of the bluff (approximately

200 feet), transects will trend east and west at 25 foot intervals to encompass the remediation area (see Attachment A for a map of transects). Each transect will vary in length depending on the extent of impact and remedial excavation. No sampling will occur outside of the remediated area (except for background samples as outlined in Section 11 of this document). At a minimum, each transect will consist of the following samples:

10.2 Sidewalls

- One sample will be collected where a sidewall measures less than 3 feet
- Two samples will be collected where a sidewall measures 3 feet to 9 feet
- Three samples will be collected where a sidewall measures greater than 9 feet

10.3 Excavation Base

At a minimum, two soil samples will be collected at the base of each transect with one sample targeting the most visually impacted material with a target frequency of one sample per 20 linear feet of base. Additional soil samples may be collected based on the width of the excavation.

10.4 Cliff Face

Several constraints exist with the Cliff Face, as established by the June 6, 2015, UC approved Plan, *Constraints Assessment Team (CAT) Activities Related to Cleaning of Cliff Faces and Contiguous Rocky Prominences*. Because of the constraints, no confirmation samples will be collected from the Cliff Face.

10.5 Culvert Water Sampling

The culvert will be flushed by introducing water at the inlet located in Section 4. A sample of the water will be collected before the flushing process to be used as a baseline. Water will be contained and recovered before it reaches soil.

- One water sample will be collected at the termination point (see Attachment A – Feature D).

Water samples will be analyzed according to the methods outlined in **Table 2.**

10.6 Section 4 Sampling Schedule

It is anticipated that the soil and water samples in Section 4 will be collected in three to four (3-4) days once the sampling area has been visually cleared, the area is safe to sample, and sampling commences barring any weather, safety concerns, or operational delays. Soil and water samples will be collected once, unless results indicate additional cleaning/excavation is required or otherwise instructed by UC.

10.7 SECTION 4 ANALYTICAL METHODS

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil samples will be analyzed under rapid turnaround (typically within 24-hrs). See **Table 1** for soil sample methods and **Table 2** for water sample methods.

11.0 BACKGROUND SAMPLING AND ANALYSIS

Background samples, as they pertain to this Addendum, will only be collected from Section 4 (Bluff). Background samples will be collected from five locations located approximately 150 feet east and five locations located approximately 150 feet west of the impacted area along the Bluff, with similar basic characteristics as the drainage path of the release. These locations are located within a quarter mile of the release site and have not been affected by activities on the site. Background samples will not be collected within XX (50?) feet of railroad tracks.

Two discrete samples will be collected at each of the ten background locations. One sample will be collected from the upper organic layer of soil. A second sample will be collected from the same boring at a depth of approximately 3 feet. Due to the lithology (terrace deposits) and topography of the Bluff, sample collection at 3 feet may not be feasible. A total of 20 background samples will be collected.

11.1 SECTION 4 ANALYTICAL METHODS

In accordance with the *Emergency Response Environmental Sampling and Analysis Plan*, soil samples will be analyzed under rapid turnaround (typically within 24-hrs). See **Table 1** for soil sample methods and **Table 2** for water methods.

12.0 BACKFILL SAMPLING AND ANALYSIS

In addition to confirmation soil samples and background soil samples, samples will also be collected from any soil that is intended to be used as backfill. Certified clean backfill for this site will be imported from an offsite source. The backfill material obtained for the Bluff will be similar to existing soils of the Bluff area. In order to certify the backfill does not contain hydrocarbon or other compounds, the backfill source will be sampled and analyzed as described below. Backfill source soils will be sampled based on the volume frequency prescribed in the Department of Toxic Substance Control (DTSC) guidance for sensitive land use properties, as outlined in the UC approved Plan, *Confirmation Soil Sampling and Analysis Plan For Refugio incident – Pipeline Excavation Area.*

13.0 SCREENING LEVELS

The cleanup endpoints for soil outlined in the Unified Command-approved *Refugio Incident Response Phase II Guidelines for Terrestrial, Marine Waters, and Shoreline Habitat Cleanup Endpoints* consist of health-protective Environmental Screening Levels (ESLs) published by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for all Chemicals of Concern (COCs) with the exception of Total Petroleum Hydrocarbons (TPH). According to the SFBRWQCB, the presence of a chemical in soil at concentrations below the corresponding ESL can be assumed to not pose a significant threat to human health, water resources, or the environment. The presence of a chemical at concentrations in excess of an ESL does not necessarily indicate adverse effects on human health or the environment, rather that additional evaluation is warranted.

The CCRWQCB and SBCEHS have determined that the following screening levels are acceptable for Areas 1, 2 and 3:

- The SFBRWQCB Commercial/Industrial Land Use Tier 1 Environmental Screening Levels for Shallow Soil with Groundwater a Current Source of Drinking Water. A complete list of these screening levels is available online at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml
- Total Petroleum Hydrocarbons (TPH)
    - TPH-Gasoline Range Organics (TPH-GRO) = 500 mg/kg
    - TPH-Diesel Range Organics (TPH-DRO) = 500 mg/kg[2]
    - TPH-Motor Oil Range Organics (TPH-MORO) = 500 mg/kg

A list of the screening levels for soils south of the railroad to the shoreline habitat are provided in **Table 3**, below. A risk evaluation may be performed in the event that a COC concentration exceeds its respective screening level. COMMENT: Cleanup endpoints at Area 4 should be protective of both human health and the marine environment. The screening levels shown in Table 3 are for human health only and EHS concurs that those are appropriate for that endpoint. Since screening levels for protection of marine environment may be difficult to obtain and/or develop under current time constraints, suggest you add statement that an ecological risk evaluation may be required for any residual contamination above background conditions.

[2] 500 mg/kg TPH-DRO soil screening level departs from the SFBRWQCB's ESL; the 500 mg/kg TPH-DRO soil screening level was determined appropriate by the CCRWQCB and SBCEHS.

Table 3 Environmental Screening Levels for Soils South of the Railroad to Shoreline Habitat[1]

Chemical	Soil Screening Level (mg/kg)
Acenaphthene	1.6E+01
Acenaphthylene	1.3E+01
Acetone	5.0E-01
Aldrin	1.3E-01
Anthracene	2.8E+00
Antimony	4.0E+01
Arsenic	1.6E+00
Barium	1.5E+03
Benzene	4.4E-02
Benzo(a)anthracene	1.3E+00
Benzo(b)fluoranthene	1.3E+00
Benzo(k)fluoranthene	1.3E+00
Benzo(g,h,i)perylene	2.7E+01
Benzo(a)pyrene	1.3E-01
Beryllium	8.0E+00
1,1-Biphenyl	6.5E-01
Bis(2-chloroethyl) ether	7.0E-05
Bis(2-chloroisopropyl) ether	1.3E-01
Bis(2-ethylhexyl) phthalate	5.7E+02
Boron	2.0E+00
Bromodichloromethane	1.5E+00
Bromoform (Tribromomethane)	1.7E+00
Bromomethane	2.8E-01
Cadmium (soil)	1.2E+01
Carbon tetrachloride	1.1E-01
Chlordane	1.7E+00
p-Chloroaniline	5.3E-02

Chlorobenzene	1.5E+00
Chloroethane	1.1E+00
Chloroform	2.4E+00
Chloromethane	2.0E+01
2-Chlorophenol	1.2E-02
Chromium (total)	2.5E+03
Chromium III	7.5E+02
Chromium VI	8.0E+00
Chrysene	1.3E+01
Cobalt	8.0E+01
Copper	2.3E+02
Cyanide	3.6E-03
Dibenz(a,h)anthracene	3.8E-01
Dibromochloromethane	6.6E+00
1,2-dibromo-3-chloropropane	4.5E-03
1,2-Dibromoethane	3.3E-04
1,2-Dichlorobenzene	1.1E+00
1,3-Dichlorobenzene	7.4E+00
1,4-Dichlorobenzene	5.9E-01
3,3-Dichlorobenzidine	1.5E-02
Dichlorodiphenyldichloroethane (DDD)	1.0E+01
Dichlorodiphenyldichloroethene (DDE)	4.0E+00
Dichlorodiphenyltrichloroethane (DDT)	4.0E+00
1,1-Dichloroethane	2.0E-01
1,2-Dichloroethane	4.5E-03
1,1-Dichloroethene	1.0E+00
cis-1,2-Dichloroethene	1.9E-01
trans-1,2-Dichloroethene	6.7E-01
2,4-Dichlorophenol	3.0E-01
1,2-Dichloropropane	1.2E-01

1,3-Dichloropropene	5.9E-02
Dieldrin	2.3E-03
Diethyl phthalate	3.5E-02
Dimethyl phthalate	3.5E-02
2,4-Dimethylphenol	6.7E-01
2,4-Dinitrophenol	4.2E-02
2,4-Dinitrotoluene	7.4E-04
1,4-Dioxane	1.5E-03
Dioxin (2,3,7,8-TCDD)	1.8E-05
Endosulfan	4.6E-03
Endrin	6.5E-04
Ethylbenzene	3.3E+00
Fluoranthene	4.0E+01
Fluorene	8.9E+00
Heptachlor	1.3E-02
Heptachlor epoxide	1.4E-02
Hexachlorobenzene	1.2E+00
Hexachlorobutadiene	4.3E+00
g-Hexachlorocyclohexane (Lindane)	9.8E-03
Hexachloroethane	5.8E+00
Indeno(1,2,3-c,d)pyrene	1.3E+00
Lead	3.2E+02
Mercury (elemental)	1.0E+01
Methoxychlor	1.9E+01
Methylene chloride	7.7E-02
Methyl ethyl ketone	4.5E+00
Methyl isobutyl ketone	2.8E+00
Methyl mercury	6.2E+01
2-Methylnaphthalene	2.5E-01
tert-Butyl methyl ether	2.3E-02
Molybdenum	4.0E+01

Naphthalene	1.2E+00
Nickel	1.5E+02
Pentachlorophenol	5.0E+00
Perchlorate	7.2E+02
Phenanthrene	1.1E+01
Phenol	7.6E-02
Polychlorinated biphenyls (PCBs)	7.4E-01
Pyrene	8.5E+01
Selenium	1.0E+01
Silver	4.0E+01
Styrene	1.5E+00
tert-Butyl alcohol	7.5E-02
1,1,1,2-Tetrachloroethane	9.1E-03
1,1,2,2-Tetrachloroethane	1.8E-02
Tetrachloroethene	7.0E-01
Thallium	1.0E+01
Toluene	2.9E+00
Toxaphene	4.2E-04
TPH gasoline	5.0E+02
TPH diesel[2]	5.0E+02
TPH motor oil	5.0E+02
1,2,4-Trichlorobenzene	1.5E+00
1,1,1-Trichloroethane	7.8E+00
1,1,2-Trichloroethane	7.0E-02
Trichloroethene	4.6E-01
2,4,5-Trichlorophenol	1.8E-01
2,4,6-Trichlorophenol	5.2E-01
Vanadium	2.0E+02
Vinyl chloride	8.5E-02
Xylenes	2.3E+00
Zinc	6.0E+02

[1] Screening levels established in the SFBRWQCB's Commercial/Industrial Land Use Tier 1 Environmental Screening Levels for Shallow Soil with Groundwater a Current Source of Drinking Water. A complete list of these screening levels is available online at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml.

[2] The 500 mg/kg TPH-diesel soil screening level was determined appropriate by the CCRWQCB and SBCEHS for protection of human health at Areas 1 -3.

14.0 FIELD QA/QC SAMPLES, REPORT RREPARATION, DOCUMENTATION, AND DATA VALIDATION

Field QA/QC samples, report preparation, documentation, and data validation will all be conducted per the *Confirmation Soil Sampling and Analysis Plan For Refugio incident – Pipeline Excavation Area* (approved by Unified Command [UC] on June 3, 2015.

15.0 REFERENCES

Department of Toxic Substances Control. Information Advisory Clean Imported Fill Material. October 2001. https://www.dtsc.ca.gov/Schools/upload/SMP_FS_Cleanfill-Schools.pdf

USEPA. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA 540/R-99/008. October 1999. http://www.epa.gov/superfund/programs/clp/download/fgorg.pdf

USEPA. Guidance on Environmental Data Verification and Data Validation. EPA WA/G-8. November 2002. http://www.epa.gov/quality/qs-docs/g8-final.pdf

USEPA. Guidance on Systematic Planning Using the Data Quality Objectives Process. EPA/240/B-06/001. February 2006. http://www.epa.gov/quality/qs-docs/g4-final.pdf

USEPA. Region III Fact Sheet Quality Control Tools: Blanks, revision 1, April 2009. http://www.epa.gov/region3/esc/qa/pdf/blanks.pdf

Attachment A

Maps

Attachment B

Data Quality Objectives Worksheet

REFUGIO INCIDENT
DATA QUALITY OBJECTIVES
MATRIX: SOIL AND WATER

STEP 1. DEFINE THE PROBLEM	
Petroleum contaminated soil may be present at the release site representing a threat to water quality, human health and the environment.	
STEP 2. IDENTIFY THE DECISION OR GOAL OF SAMPLING/STUDY	
Soil and water samples will be collected from Sections as outlined in this Addendum from Sections 1-4 to (1) characterize the chemical composition of the soil, (2) compare to the chemical of concern (COC) associated with the released crude oil (3) compare results to screening levels discussed in Section 13 (4) compare results to visually non-impacted, background sample results in Section 4 (5) make determinations on whether area can be backfilled with soil or further evaluation needs to be considered (6) determine if culverts need additional cleaning based on water sample results	
IDENTIFY THE ALTERNATIVE ACTIONS THAT MAY BE TAKEN BASED ON THE DECISIONS.	• If COCs in the soil samples are present at concentrations below applicable screening values, then no further sampling of the excavation is required. Also, no further excavation is required and/or backfill with certified clean soil can be performed
STEP 3. IDENTIFY INPUTS NEEDED FOR THE DECISION	
IDENTIFY THE INFORMATIONAL INPUTS NEEDED TO RESOLVE A DECISION.	• Background sampling results • Results of excavation sampling • Backfill sampling results • Compared results to applicable screening values outlined in Section 13.

IDENTIFY THE SOURCES FOR EACH INFORMATIONAL INPUT AND LIST THE INPUTS THAT ARE OBTAINED THROUGH ENVIRONMENTAL MEASUREMENTS.	Sections 1-3 • Analytical results from Total Petroleum Hydrocarbons (TPH) as gasoline range organics (GRO) by EPA 8015 or 8260. • Volatile organic compounds (VOCs) following EPA Method 8260. • TPH for diesel range organics (DRO) and oil range organics (ORO) by EPA method 8015. No silica gel cleanup • Polycyclic aromatic hydrocarbons (PAH) by SIM using EPA Method 8270C. • California Assessment Manual (CAM) 17 metals EPA method 6010. • Background sampling results. • Backfill sampling results • Sample location coordinates and relational proximity to the crude oil release area. Section 4 • All the above referenced methods. • Fractionated TPH for extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) by Massachusetts Department of Environmental Protection (MASS DEP EPH/VPH method) • Synthetic precipitation leaching procedures (SPLP) following analytical methods by EPA 1312
BASIS FOR THE CONTAMINANT SPECIFIC ACTION LEVELS.	Soil and water samples will be collected from the Sections 1-4 to determine absence or presence of crude oil constituents, compare to background sampling results, and then compare to site-specific screening levels to determine actions.
IDENTIFY POTENTIAL SAMPLING TECHNIQUES AND APPROPRIATE ANALYTICAL METHODS.	• TPH-GRO by EPA 8260 or EPA 8015 • VOCs by EPA 8260 or EPA 5035 • TPH-DRO by EPA 8015 (No silica gel) • TPH-ORO by EPA 8015 (No silica gel) • PAHs by SIM using EPA 8270C • CAM 17 metals by EPA 6010 (field filtered) • TPH-EPH/VPH by MASS DEP EPH/VPH • SPLP by EPA 1312

STEP 4. DEFINE THE BOUNDARIES OF THE STUDY	
DEFINE THE DOMAIN OR GEOGRAPHIC AREA WITHIN WHICH ALL DECISIONS MUST APPLY.	See specifics for each Section. Section 1: The inlet of the drainage conduit is located adjacent to the west end of the pipeline repair excavation and approximately 200 feet north of the Hwy 101 north right-of-way. The length of drainage conduit from the inlet to the drainage conduit termination point, located adjacent to the Hwy 101 north right-of-way, is approximately 170 linear feet. Section 2: The drainage pipe that runs under Hwy 101 measures approximately 250 linear feet from the inlet on the north side of the Hwy 101 north right-of-way to the termination point located on the south side of Hwy 101. A drainage drop inlet is located in the median of Hwy 101, adjacent to the north side of the Hwy 101 south right-of-way. The termination point of the drainage pipe is located approximately 6 feet from the culvert inlet that runs under the Union Pacific Railroad (UPRR) track. Section 3: Section 3 includes the drainage pipe termination point, a soil and concrete area, and the inlet for the culvert pipe that runs under the UPRR. The culvert measures approximately 20 linear feet from the inlet on the north to the termination point on the south. Section 4: The Bluff area extends from the termination point of the culvert that runs under the UPRR to the approximate edge of the cliff face. The Bluff area is generally longer than it is wide as it followed the path of historical drainage. Although the historic drainage path meanders, the approximate length of the impacted area is approximately 200 feet. The width of the impacted area varies from north to south, toward the Cliff. For background samples, samples are being collected approximately 150 feet east of the impacted area and approximately 150 west of the impacted area from visually non-impacted areas and will not be collected within 50-feet of UPRR tracks
SPECIFY THE CHARACTERISTICS THAT DEFINE THE POPULATION OF INTEREST.	Results are representative of the area sampled. See Section above. Additionally, samples will be collected where visual observations indicate there may be an area that could have the potential for impact.
DEFINE THE SCALE OF DECISION MAKING.	Results of soil and water samples will be used to determine the absence or presence of COCs in soil and water against established screening levels. Results will be provided to EUL and then to UC for further determinations. For section 4 this may include completion of an ecological risk assessment to evaluate impacts of residual contamination on the marine environment.
DETERMINE THE TIME FRAME TO WHICH THE DATA APPLY.	The data will apply until the soil represented by the samples receives appropriate response actions.

DETERMINE WHEN TO COLLECT DATA.	Samples will be collected upon approval of the sampling and analysis plan.
IDENTIFY PRACTICAL CONSTRAINTS ON DATA COLLECTION.	• Inclement weather. • Access not attainable. • Not safe to enter trench (use alternate sampling method such as collection using a backhoe or excavator bucket).
STEP 5. DEVELOP ANALYTICAL APPROACH/ DECISION RULE	
SPECIFY THE PARAMETER THAT CHARACTERIZES THE POPULATION OF INTEREST.	Detection of COCs in soil and water samples by analytical testing compared to laboratory established MDLs, and screening values, and then background concentrations.
SPECIFY THE ACTION LEVEL FOR THE DECISION.	• The RWQCB Commercial/Industrial Land Use Tier 1 Environmental Screening Levels for Shallow Soil with Groundwater a Current Source of Drinking Water. A complete list of these screening levels is available online at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml • Total Petroleum Hydrocarbons (TPH) o TPH-Gasoline Range Organics (TPH-GRO) = 500 mg/kg o TPH-Diesel Range Organics (TPH-DRO) = 500 mg/kg[3] o TPH-Motor Oil Range Organics (TPH-MORO) = 500 mg/kg A list of the screening levels for soils south of the railroad to the shoreline habitat that are protective of human health are provided in **Table 3** but do not consider or apply to protection of marine environment. Additional evaluation of ecological risk may be required to address residual contamination in Area 4. • If chemicals are identified in soil samples are present above screening levels additional excavation may be warranted.
STEP 6. SPECIFY PERFORMANCE OR ACCEPTANCE CRITERIA OR LIMITS ON DECISION ERRORS	
DEVELOP A DECISION RULE.	If sample results are higher than background concentrations or UC determined screening values, then further actions are required. If background sampling results are deemed valid by a third party validator and are at concentrations higher than UC agreed upon screening values, then background sampling results become the new screening values.
DETERMINE THE POSSIBLE RANGE OF THE PARAMETER OF INTEREST.	Contaminant concentrations may range from below the RL for each specific constituent to more than the UC approved screening value.

[3] 500 mg/kg TPH-DRO soil screening level departs from the RWQCB's ESL; the 500 mg/kg TPH-DRO soil screening level was determined appropriate by the Central Coast Water Board and Santa Barba County Public Health Department.

DEFINE BOTH TYPES OF DECISION ERRORS AND IDENTIFY THE POTENTIAL CONSEQUENCES OF EACH.	See Section 5. Determinations about actions are to be determined by UC.
DEFINE THE TRUE STATE OF NATURE FOR THE MORE SEVERE DECISION ERROR AS THE BASELINE CONDITION OR THE NULL HYPOTHESIS (H_o) AND DEFINE THE TRUE STATE FOR THE LESS SEVERE DECISION ERROR AS THE ALTERNATIVE HYPOTHESIS (H_a).	Ho: The soil represented by the sample is above the UC approved screening value. Ha: The soil represented by the sample is below the UC approved screening value.
ASSIGN THE TERMS "FALSE POSITIVE" AND "FALSE NEGATIVE" TO THE PROPER DECISION ERRORS.	• False Positive Error = Type I • False Negative Error = Type II
ASSIGN PROBABILITY VALUES TO POINTS ABOVE AND BELOW THE ACTION LEVEL THAT REFLECT THE ACCEPTABLE PROBABILITY FOR THE OCCURRENCES OF DECISION ERRORS.	To be assigned based on discussions with UC.
STEP 7. OPTIMIZE THE DESIGN	
REVIEW THE DQOs.	Not applicable.
DEVELOP GENERAL SAMPLING AND ANALYSIS DESIGN. See SAP for details.	